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ROBERT J. SILVERMAN

To: Regional Director
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1. AGENCY USE ONLY (Leave blank)	2 REPORT DAIL 3 February 1996	Final Techn	ATES COVERED nical 10/1/89-9/30/95
4 THE AND SUBSTITE Energetic Particles a	and Magnetic Fields	in the	5 FUNDING NUMBERS
Earth's Magnetosphere and Interplanetary Space			AG 175 1319 WIAE ROT Project Code 3143103-10
James A. Van Allen (P.I.)			
7 PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)			8. PERFORMING ORGANIZATION REPORT NUMBER
Department of Physics The University of Iow Iowa City, IA 52242-	<i>r</i> a		U. of Iowa 96-2
9. SPONSORING/MONITORING AGENCY NAME(Office of Naval Resea 800 North Quincy Stre Arlington, VA 22217	ırch		10 SPONSORING/MONITORING AGENCY REPORT NUMBER
11 SUPPLEMENTARY NOTES			
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128 DISTRIBUTION/AVAILABILITY STATEMENT	THE STATE OF THE S	19976	717 110
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13 ABSTRACT (Maximum 200 words)

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The final technical report is a bibliography of published work supported in whole or in part by the subject grant in magnetospheric physics, cosmic rays and interplanetary energetic particles.

DTIC QUALITY INSPECTED 4

14 SUBJECT 1 magne	etospheres			15 NUMBER OF PAGES 8
ener	getic particle c rays	es		16 PRICE CODE
17 SECURITY OF REPORT	CLASSIFICATION	18 SECURITY CLASSIFICATION OF THIS PAGE	19 SECURITY CLASSIFICATION OF ARCHACT	20 LIMITATION OF ABSTRACT
Uncla	assified	Unclassified	Unclassified	

FINAL TECHNICAL REPORT

TO

OFFICE OF NAVAL RESEARCH

ONR Grant N00014-89-J-1179

1 October 1989 — 30 September 1995

Energetic Particles and Magnetic Fields in the Earth's Magnetosphere and Interplanetary Space

Principal Investigator: JAMES A. VAN ALLEN

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- A. Published Work Dependent on Data Analysis
 Equipment Acquired Under Grant ONR
 N00014-89-J-1179 and Its Predecessor
 ONR Grants to the University of Iowa
- ONSAGER, T. G., R. H. HOLZWORTH, H. C. KOONS, O. H. BAUER, D. A. GURNETT, R. R. ANDERSON, H. LUHR, and C. W. CARLSON
 High-frequency Electrostatic Waves Near Earth's Bow Shock
 J. Geophys. Res., 94, 13,397-13,408, 1989
- CHRISTON, S. P., D. J. WILLIAMS, D. G. MITCHELL, L. A. FRANK, and C. Y. HUANG

 Spectral Characteristics of Plasma Sheet Ion and Electron
 Populations During Undisturbed Geomagnetic Conditions
 J. Geophys. Res., 94, 13,409–13,424, 1989
- FAIRFIELD, D. H., D. N. BAKER, J. D. CRAVEN, R. C. ELPHIC, J. F. FENNELL, L. A. FRANK, I. G. RICHARDSON, H. J. SINGER, J. A. SLAVIN, B. T. TSURUTANI, and R. D. ZWICKL
 Substorms, Plasmoids, Flux Ropes, and Magnetotail
 Flux Loss on March 25 1983: CDAW 8
 J. Geophys. Res., 94, 15,135–15,152, 1989
- ANGELOPOULOS, V., R. C. ELPHIC, S. P. GARY, and C. Y. HUANG
 Electromagnetic Instabilities in the Plasma Sheet
 Boundary Layer
 J. Geophys. Res., 94, 15,373-15,383, 1989
- FRANK, L. A., J. B. SIGWARTH, and J. D. CRAVEN Search for Atmospheric Holes with the Viking Cameras Geophys. Res. Lett., <u>16</u>, 1457–1460, 1989
- KRIMIGIS, S. M., T. P. ARMSTRONG, W. I. AXFORD, C. D. BOSTROM, A. F. CHENG, G. GLOECKLER, D. C. HAMILTON, E. P. KEATH, L. J. LANZEROTTI, B. H. MAUK, and J. A. VAN ALLEN Hot Plasma and Energetic Particles in Neptune's Magnetosphere Science, 246, 1483-1489, 1989

- FRANK, L. A., J. B. SIGWARTH, and C. M. YEATES
 A Search for Small Solar-System Bodies Near the Earth Using
 A Ground-Based Telescope: Technique and Observations
 Astron. Astrophys., <u>228</u>, 522-530, 1990
- FRANK, L. A., J. B. SIGWARTH, and J. D. CRAVEN Reply Geophys. Res. Lett., <u>17</u>, 1175–1176, 1990
- BAKER, D. N., D. H. FAIRFIELD, J. A. SLAVIN, I. G. RICHARDSON, J. D. CRAVEN, L. A. FRANK, H. J. SINGER, C. J. OWEN, and R. D. ZWICKL

 The Substorm Event of 28 January 1983: A Detailed Global Study Planet. Space Sci., 38, 1495–1515, 1990
- B. Original Published Work Performed by Personnel Receiving Salary Support from Grant ONR N00014-89-J-1179
- VAN ALLEN, J. A., and C. L. GROSSKREUTZ Relativistic Electrons in Saturn's Inner Magnetosphere and an Estimate of Their Synchrotron Emission J. Geophys. Res., <u>94</u>, 8731–8738, 1989
- VAN ALLEN, J. A., and J. D. MIHALOV Forbush Decreases and Particle Acceleration in the Outer Heliosphere Geophys. Res. Lett., <u>17</u>, 761–764, 1990
- FARRELL, W. M., and J. A VAN ALLEN
 Observations of the Earth's Polar Cleft at Large
 Radial Distances with the Hawkeye 1 Magnetometer
 J. Geophys. Res., 95, 20,945-20,958, 1990
- VAN ALLEN, J. A., and J. ADNAN
 Observed Currents on the Earth's High-Latitude Magnetopause
 J. Geophys. Res., <u>97</u>, 6381–6395, 1992

VAN ALLEN, J. A., and R. W. FILLIUS

Propagation of a Large Forbush Decrease in Cosmic-Ray Intensity Past the Earth, Pioneer 11 at 34 AU, and Pioneer 10 at 53 AU Geophys. Res. Lett., 19, 1423-1426, 1992

VAN ALLEN, J. A.

Recovery of Interplanetary Cosmic Ray Intesity Following the Great Forbush Decrease of Mid-1991 Geophys. Res. Lett., <u>20</u>, 2797–2800, 1993

VAN ALLEN, J. A.

1957 Survey of Cosmic Ray Intensity, 0 to 25 km Altitude and 86° N to 73° S Geomagnetic Latitude J. Geophys. Res., 99, 17,631–17,636, 1994

RANDALL, B. A.

Energetic Electrons in the Magnetosphere of Saturn J. Geophys. Res., <u>99</u>, 8771–8785, 1994

VAN ALLEN, J. A., and B. A. RANDALL Survival of a Thin Mica Window on Pioneer 11 During 21 Years of Interplanetary Flight U. of Iowa Research Report 94–16, 8 November 1994

VAN ALLEN, J. A.

Early Rocket Observations of Auroral Bremsstrahlung and Its Absorption in the Mesosphere J. Geophys. Res., <u>100</u>, 14,485–14,497, 1995

VAN ALLEN, J. A.

Twenty-Five Milliamperes: A Tale of Two Spacecraft J. Geophys. Res., in press, 1996

C. Reviews and Related Publications by the Principal Investigator of Grant ONR N00014-89-J-1179

VAN ALLEN, J. A.

What Is a Space Scientist? An Autobiographical Example Ann. Rev. Earth Planet. Sci., <u>18</u>, 1–26, 1990

VAN ALLEN, J. A.

Magnetospheres, Cosmic Rays, and the Interplanetary Medium, pp. 29–40 of <u>The New Solar System</u>, Third Edition, edited by J. K. Beatty and A. Chaikin, Sky Publishing Corporation and Cambridge University Press, 1990,

VAN ALLEN, J. A.

Active Experiments in Magnetospheric Physics, pp. 9–20 of <u>Magnetospheric Physics—Achievements and Prospects</u>, edited by B. Hultqvist and C.-G. Fälthammar, Plenum Press, New York, 1990

VAN ALLEN, J. A.

The Magnetospheres of Eight Planets and the Moon, Nansen Memorial Lecture, Norwegian Academy of Science and Letters, Oslo, Norway, 10 October 1990, 60 pp.

VAN ALLEN, J. A.

On the Future of Space Science and Applications, pp. 11–18 of Nansen/Birkeland Symposium, Norwegian Academy of Science and Letters, Oslo, Norway, 11 October 1990,

VAN ALLEN, J. A.

Why Radiation Belts Exist EOS, Trans. Am. Geohys. Union, 72, 361, 363, 1991

VAN ALLEN, J. A.

Radiation Belts, pp. 1009–1010 of Encyclopedia of Physics, 2nd Edition, edited by R. A. Lerner and G. L. Trigg, VCH Publishers, Inc., New York, 1991

VAN ALLEN, J. A.

The Outer Planets and the Heliosphere, pp. 29–32 <u>Proceedings of Symposium for Reimer Lüst</u>, Paris, France, 27 September 1990, ESA SP-325, Feb. 1991

VAN ALLEN, J. A.

The Modern Saga of Planetary Exploration, 19 pp., Ninth Annual Presidential Lecture, University of Iowa, 1992

VAN ALLEN, J. A.

)

Interplanetary and Heliospheric Missions, pp. 319–321 of <u>The Astronomy and Astrophysics Encyclopedia</u>, edited by Stephen P. Maran, Van Nostrand Reinhold, New York, 1992

VAN ALLEN, J. A.

The Heliospheric Boundary J. Geophys. Res., <u>98</u>, 15,121, 1993

VAN ALLEN, J. A., Editor

Cosmic Rays, the Sun, and Geomagnetism: The Works of Scott E. Forbush, [Book] 495 pp. American Geophysical Union, Washington, DC, 1993 ISBN 0-87590-833-0

VAN ALLEN, J. A.

Where Is the Cosmic-Ray Modulation Boundary of the Heliosphere? pp. 20-32 of <u>Currents in Astrophysics and Cosmology</u>, edited by G. G. Fazio and R. Silberberg, Cambridge University Press, 1993

VAN ALLEN, J. A.

924 Elementary Problems and Answers in Solar System Astronomy, [Book] 251 pp., U. of Iowa Press, Iowa City, 1993 ISBN 0-87745-434-5

Guide to the James A. Van Allen Papers and Related Collections by Christine D. Halas, Project Archivist [Book], 335 pp., The University of Iowa Archives, Iowa City, 1993

VAN ALLEN, J. A.

Remarks from the Van Allen Symposium EOS, Trans. Am. Geohys. Union, <u>75</u>, 397, 1994

VAN ALLEN, J. A.

Radiation Belts
An invited article for the <u>Macmillan Encyclopedia</u>
of Physics, submitted, 1995

VAN ALLEN, J. A.

)

Van Allen Radiation Belts Gale Encyclopedia of Science, submitted, 1995

VAN ALLEN, J. A.

"Science with Balloons," A review of the book
Race to the Stratosphere: Manned Scientific
Ballooning in America, 406 pp. by D. H. DeVorkin,
Springer-Verlag, New York, 1989, Journal for the History
of Astronomy, 26, 177-179, 1995

VAN ALLEN, J. A.

"War and Peace," a review of the book Science with a Vengeance: How the Military Created the US Space Sciences After World War II, by D. H. DeVorkin, Springer-Verlag, New York, 1992, Journal for the History of Astronomy, 26, 179–181, 1995

VAN ALLEN, J. A.

Investigation of the Planets by Space Techniques, Encyclopedia of Planetary Sciences, edited by J. H. Shirley and R. W. Fairbridge, Chapman and Hall, London, in press, 1996